Subject: Re: Basshorn or Transmission Line
Posted by Wayne Parham on Tue, 07 Jun 2005 21:27:37 GMT
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When you're talking about horns that are large enough to be of wavelength proportions, then the peaks down low are much smoother. It acts like a horn at lower frequencies, and less like a tuned pipe. When the mouth is truncated for space reasons, the device becomes a pipe. The mouth expansion is needed; That's key to being a horn.As for the overall shape, generally tighter flares are more efficient and operate to a lower cutoff point. The range goes from hyperbolic to exponential to conical to parabolic. Hyperbolic horns have long narrow throats that expand very little until the end. Parabolic horns open widely at first, but then expand less and less. Conical has straight side walls and exponential is in between. Hyperbolic is the most efficient but creates the most throat distortion. Parabolic makes the least distortion, but offers little in the way of efficiency.I think it is also important to look at the directionality, because that is one of the features of a horn. Horns act as resonators, velocity/pressure impedance matching devices and energy concentrators by way of introducng directionality via contstrained space. The combination of effects is what sets the overall performance of a horn.For example, a conical horn is pretty simple in that the walls are straight. Essentially, the energy pattern is set by the horn walls and it is basically uniform for all frequencies. So the output of the horn is uniform throughout its radiating angle which is set by the wall angle. Frequency response is set by the output of the driver. The horn is really just a contstrained space, with some pipe modes down low. Exponential and hyperbolic horns have curved walls, so their directionality changes with frequency. They tend to load lower, and because of collapsing directivity, the on-axis output is increased at high frequencies too. So exponential and hyperbolic horns tend to modify driver response more than conical horns do.